

Acute Pyelonephritis

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Case History & Examination

A 45-year-old female presented to the Department of Medicine clinic at a tertiary care referral hospital, Delhi, India with the chief complaints of **fever, right loin pain** associated with **nausea** and **dysuria** since last 5 days. She gave the history of visiting a private clinic 3 weeks earlier with similar complaints and received parenteral antibiotics for the same, to which she responded initially but again developed fever and right flank pain and visited our hospital. She is a known case of Diabetes mellitus and is on regular oral hypoglycemic agents for the last 2 years. She also has a history of recurrent urinary tract infections in the past.

On physical examination, the patient was found to be **febrile** with oral temperature **39.5°C**, heart rate 93 bpm, and blood pressure 100/60 mm Hg. No signs of pallor, icterus or lymphadenopathy were seen. Chest and cardiac auscultation did not reveal any abnormality. On palpation, the abdomen was found to be soft and lax but there was **right renal angle tenderness**. The patient was admitted to medicine ward in view of **persistent fever** and **recurrent urinary tract infections** for further evaluation and laboratory investigations. The results as shown below (Table 1):

Laboratory Investigations

Blood investigation	Test result	Biological reference interval
Complete blood count		
Hemoglobin	12.5 gm/dL	12-15.5gm/dL
WBC-TLC	12 x 10³/μl	5-10 x10 ³ /μl
Neutrophils	82%	60-75%
Lymphocytes	20.0%	20-40%
Platelets	160 × 10 ³ /μL	150-400 x 10 ³ /μL
Renal function tests		
Urea	30 mg/dl	18-55mg/dl
Creatinine	2.7 mg/dl	0.5-1.1mg/dl
Serum electrolytes		
Sodium	139 mEq/L	135-145 mEq/L
Potassium	4.8 mEq/L	3.5-5.3 mEq/L
HbA1c Value	7.5%	4.2%- 5.7%
C-reactive protein (CRP)	90 mg/L	< 5 mg/L

Routine investigations revealed **high HbA1c value** (7.5%) with normal serum sodium levels, normal levels of urea and haemoglobin. Serum **creatinine** was raised. **TLC** was also raised along with **CRP** depicting **infection**. Further blood culture test was ordered for which two sets of blood samples were collected in aerobic and anaerobic bottles; only one of the **aerobic** bottles was flagged **positive** in the after >48 hrs of incubation. The gram-stained smear of the sample from the positive blood culture bottle showed presence of **gram-negative bacilli in clumps**, and culture on blood agar plates also grew the same organism.



The isolate was positive for **indole** and **catalase**, whereas oxidase, citrate and urease were negative (Figure: 1).



Figure 1: Isolate positive for indole (marked)

Urine Examination

Urine routine and microscopic examination	Test result	Reference
Physical Examination		
Volume	20 mL	
Color	Pale yellow	Straw colored
Transparency	Clear	Clear
Deposit	Absent	Absent
Chemical Examination		
Urine glucose	Positive	Negative
Urine protein	0.25 g/l	(normal <0.1 g/l)– Dipstick
Nitrite	Positive	Negative
Microscopic Examination		
Leukocytes	70-80/hpf	Normal <0-4/hpf
Erythrocytes	55/ hpf	Normal <0-4/hpf
Bacteria	2+	Absent

Urine Routine/Microscopy revealed urine protein 0.25 g/l (normal <0.1 g/l) by Dipstick, while glucose and nitrites were positive. Microscopy–revealed leukocytes 70–80/hpf (normal <0–4/hpf), erythrocytes 55/hpf (normal <0–4/hpf) and bacteria 2+ (Table 2). Urine ketone bodies, bilirubin, urobilinogen, and leukocyte esterase were negative.

Urine sample was also collected for culture (clean catch mid–stream urine), which showed yield growth of *E. coli* on CLED agar plates after 18 hrs of incubation (Figure: 2).

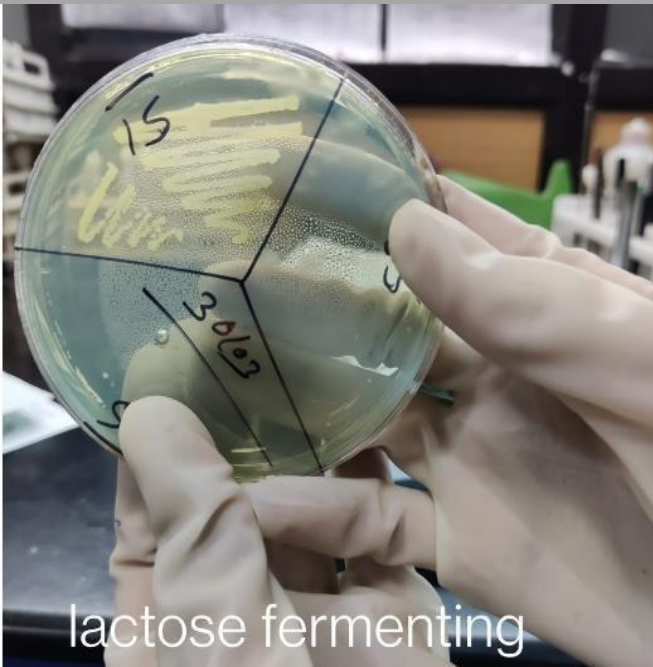


Figure 2: Colonies of lactose fermenting bacteria on CLED agar plates after 18 hrs of incubation

Antibiotic susceptibility testing (AST)

It was done by Kirby Bauer disk diffusion susceptibility test method on Mueller Hinton agar plates which showed the bacteria resistant to ciprofloxacin and sensitive to 1st generation cephalosporin's (Figure 3).

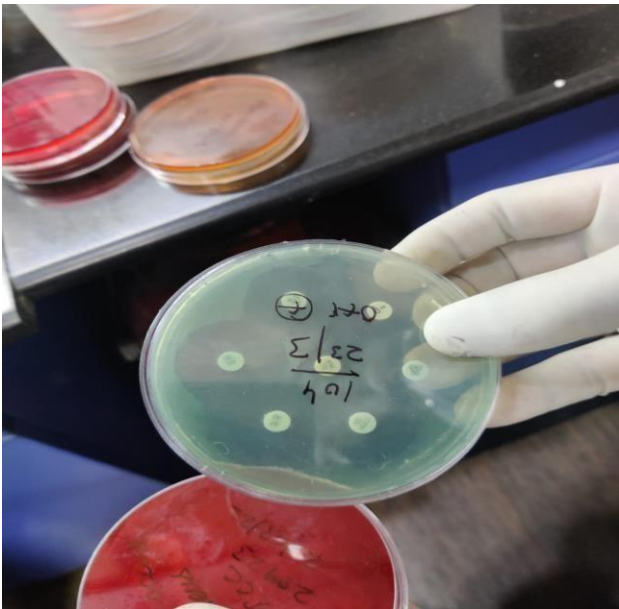


Figure 3: Mueller Hinton agar plates which showed the bacteria resistant to ciprofloxacin and sensitive to 1st generation cephalosporins

Radiological examination:

Ultrasound findings revealed **enlargement of kidney** in size with surrounding **perinephric fat stranding** along with **ptheresence of calculi** in the right kidney (Figure 4).

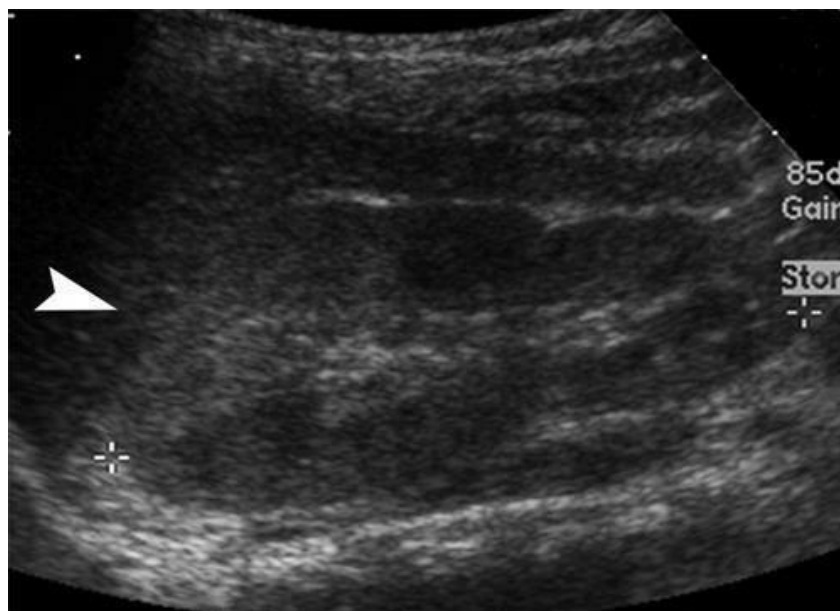


Figure 4: USG findings: Hypoechoic kidney with renal sinus fat lost.

Interpretation & Analysis

Major hospital admissions due to lower urinary tract infections have a high chance of progressing to upper urinary tract and cause pyelonephritis. Inflammation of the renal parenchyma brought on by bacteriuria that travels from the bladder via the ureters and up to the kidneys is the hallmark of acute pyelonephritis.

In this case study, urinary analysis, radiological results, together with the recognized presenting symptom triad of nausea, fever, and flank pain allowed the practitioner to make the diagnosis of acute pyelonephritis. The diagnosis for Pyelonephritis was mainly done on the basis of clinical history, urine microscopy and culture and blood culture. Radiological findings of ultrasound helped rule out other possibilities such as a renal abscess and emphysematous kidney. Complications were ruled out by other biochemical blood investigations.

Being a female, known diabetic patient with history of recurrent episodes of UTI made the patient more prone to develop pyelonephritis. Urine culture which showed yield growth of *E. coli* on CLED agar plates, also led the way closer to the diagnosis, as *E. coli* is the most common bacteria to cause pyelonephritis. Furthermore, antibiotic sensitivity testing helped us know that the patient was resistant to ciprofloxacin treatment.

So correct line of treatment was started during her inpatient stay: IV ampicillin + 1 aminoglycoside until afebrile till 24 hours, then oral antibiotics for 3 weeks. These antibiotics were adjusted accordingly after monitoring of AST results. Patient's condition improved as reported in the follow up visits to the OPD.

Diagnosis:**ACUTE PYELONEPHRITIS**

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